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(54) Perforated pre-stretched stretch film for pallet wrapping

(57) The present invention concerns perforated pre-stretched plastic stretch film (12,11) for pallet wrapping on which holes (24,12,14) have been opened with the use of thermal radiation, employing an apparatus of our own technology, resulting in material accumulation (3,13) around the hole lip, which in combination with the

holes lay-out, allows the film stretching and the achieving of large mechanical strength whereas the weight/m² remains significantly smaller than the up to now known products.

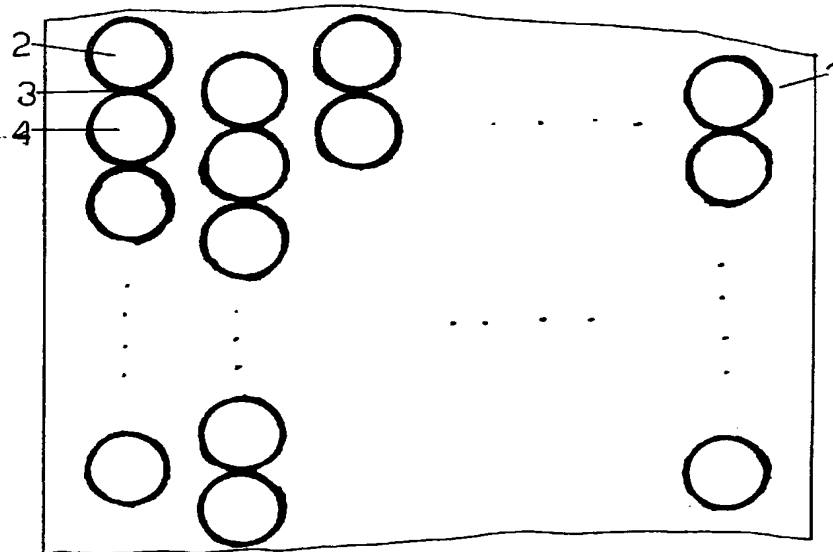


FIG 1

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Description

The present invention is referred to perforated pre-stretched plastic stretch film for pallet wrapping suitable for products requiring ventilation.

These stretch films are used for goods such as fruits, vegetables, plants, deep freeze goods, living organisms etc. They have holes opened through their surface in order that the goods can be ventilated. An essential feature of those stretch films is the smallest possible thickness in relation to the maximum possible mechanical strength, while the ease of use is determinative.

Similar products include the wrapping nets and the non-stretched perforated wrapping films, which have certain disadvantages causing their gradual limitation of use in the market.

The disadvantages of the wrapping nets include the difficulty in use since there are two knots required to be made by hand, one at the beginning and one at the end of the pallet. Furthermore, a huge volume of scrap is created which causes problems to forklifts and rest vehicles, by jamming in their driving systems.

For the same reason there are difficulties created in the collection of this scrap.

The disadvantage of the non-stretched perforated films is the high cost, due to the large material quantity per unit area so that the correct quality can be achieved. Furthermore, these films are perforated by using mechanical means which does not allow application to very thin films, since it is not possible to create holes with material accumulated around their lips.

Therefore the mechanical perforation is used for relatively thick films, resulting in increased product cost with relatively low mechanical strength. In addition any angle at the lip of the hole create points of potential mechanical fault (tearing) of the product. Additionally, due to the remainders created, there is scrap during production.

The present invention concerns a new perforated pre-stretched film for pallet wrapping, made of stretch film. For the manufacturing of this perforated pre-stretched stretch film, the holes are opened with the use of new technology without contact with the film (use of thermal radiation). In this way, material accumulation is created around the lip of the hole, which, combined with the distance among the holes and their geometrical order, allows the stretching of the film in an easy and simple manner in order that excellent mechanical properties can be achieved while keeping small thickness. It has to be pointed out that stretching of non-perforated film is extremely difficult and requires special mechanisms.

The perforated pre-stretched stretch film for pallet wrapping, has the following advantages compared to other commercial products for pallet wrapping :

- 1) Its weight is less than 12 gr/m² compared to 16-

25 gr/m² of the non-stretched perforated film for pallet wrapping, resulting in significant saving of stretch film and therefore a cheaper product for the end user. In addition, the thickness is less than 14 microns, compared to 18-25 microns of non-stretched film.

2) Its strength (breaking point) for width 0.5 m and weight less than 12 gr/m², is greater than 18 kg compared to max 12-13 kg of other perforated films for pallet wrapping (non-stretched and perforated using mechanical means). Thus, in combination to the smaller weight mentioned before, the product has greater mechanical strength and, at the same time, smaller weight, and therefore we have wider field of applications and better results during the application with simultaneous cost reduction.

3) The holes of the perforated pre-stretched stretch film occupy the 30-70% of its surface compared to max 20% of the perforated non-stretched film, thus allowing much better ventilation of the packed product.

4) There is no scrap created during the production of the film due to the fact that there is no material removed for opening the hole, resulting in reduction of production cost, avoiding environmental pollution and untidiness of the production area and no need for scrap recycling.

5) Since the holes are opened on the film using thermal radiation, they have a smooth lip without irregularities or angles, there is no danger of material fault (tearing) and all conditions for stretching are created.

6) Lower investment cost (approximately 1/4) for the production of the perforated pre-stretched stretch film compared to the one required for other products for similar use such as pallet wrapping net.

7) Easier use for pallet wrapping, since there is only one knot to be made by the user when starting wrapping the pallet, because the perforated pre-stretched stretch film contains adhesive material. With other products such as the pallet wrapping net, there are two knots required.

8) When unpacking a pallet packed with perforated pre-stretched film, there is a very small volume of scrap (due to the sticky texture and the small weight per m²). Therefore, there are no problems with the forklifts (jamming at the wheels etc) as with the pallet wrapping net.

9) Smaller environmental pollution due to smaller weight per m² of product, and smaller recycling cost (concentration of larger quantities and in this sense less often recycling) compared to the non-stretched perforated stretch film.

It has to be noted that there are many methods for the manufacturing of perforated stretch film without its being successfully stretched above 150-200%. The use of thermal radiation for the opening of holes which is used for manufacturing the perforated pre-stretched stretch film according to the present invention, allows material accumulation around the hole lip. Furthermore, this way helps avoiding the creation of irregularities and angles which can become cause of fault (tearing). In addition, successive holes are almost in touch at the direction of stretching.

The above, result in the possibility of stretching the film in an easy, simple and economical manner with elongation 200-500%.

Thus a new product is created, the perforated pre-stretched stretch film for pallet wrapping, with excellent mechanical properties and smaller weight per m².

The above are illustrated in the following figs 1-2. In fig 1, the perforated pre-stretched stretch film for pallet wrapping according to the present invention is shown, just after perforation and before stretching. In fig 2 the same film is shown after stretching.

In more detail, fig 1 shows stretch film (1) on which holes (2) have been opened in such a way that material accumulates around the hole lip, while the neighbouring hole (4) is close in relation to its diameter at the direction of stretching. Thus the material is also accumulated in section (3) between the holes. The holes shown in the figure are indicative. In the product the holes are opened across the total area of the film.

Fig 2 shows the same film (11) after stretching, where the section (13) between the holes (12,14) has not been elongated.

Claims

1. Perforated pre-stretched packaging film, made of stretch film which is characterized by the following :

- a) There are holes opened on the surface of the stretch film in such a way that film stretching is allowed.
- b) The stretch film has been subjected to elongation more than 200-500 %.
- c) The perforated pre-stretched stretch film has weight smaller than 12 gr/m²
- d) The perforated pre-stretched stretch film has breaking point greater than 18 kg for width of 50 cm.
- e) The holes on the surface of the perforated pre-stretched stretch film occupy 30-70 % of the area

f) The perforated pre-stretch stretch film has thickness smaller than 14 microns.

2. Perforated pre-stretched stretch film according to claim 1 characterized by the fact that the holes (2,4) before stretching have material accumulation around their lips and at their contact point (3) and they are close to each other in relation to their diameter at the direction of stretching, allowing in this way the stretching to be done.
3. Perforated pre-stretched stretch film according to claims 1 and 2 characterized by the fact that it is designed for packaging deep freeze products.
4. Perforated pre-stretched stretch film according to claims 1 and 2 characterized by the fact that it is designed for packaging live organisms.
5. Perforated pre-stretched stretch film according to claims 1 and 2 characterized by the fact that it is designed for packaging warm products.
6. Perforated pre-stretched stretch film according to claims 1 and 2 characterized by the fact that it is designed for packaging animal food.
7. Perforated pre-stretched stretch film according to claims 1 and 2 characterized by the fact that it is designed for packaging flowers.
8. Perforated pre-stretched stretch film according to claims 1 and 2 characterized by the fact that it is designed for packaging products requiring ventilation.
9. Perforated pre-stretched stretch film according to claims 1 and 2 characterized by the fact that it is designed for packaging fruits and vegetables.

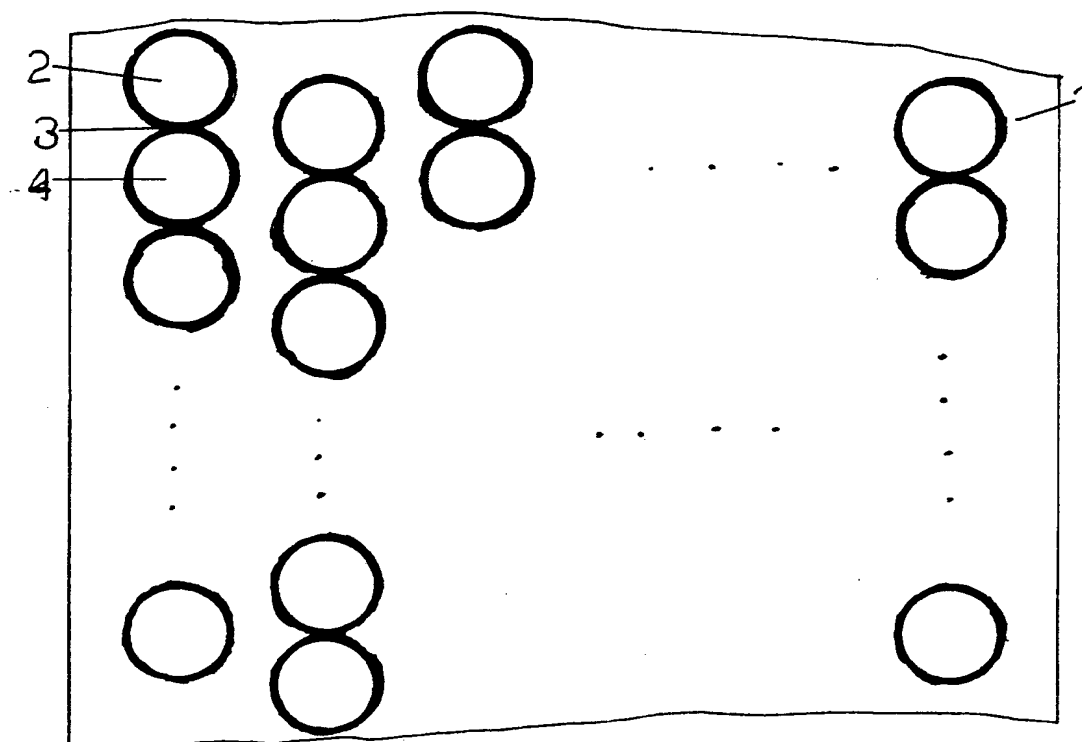


FIG 1

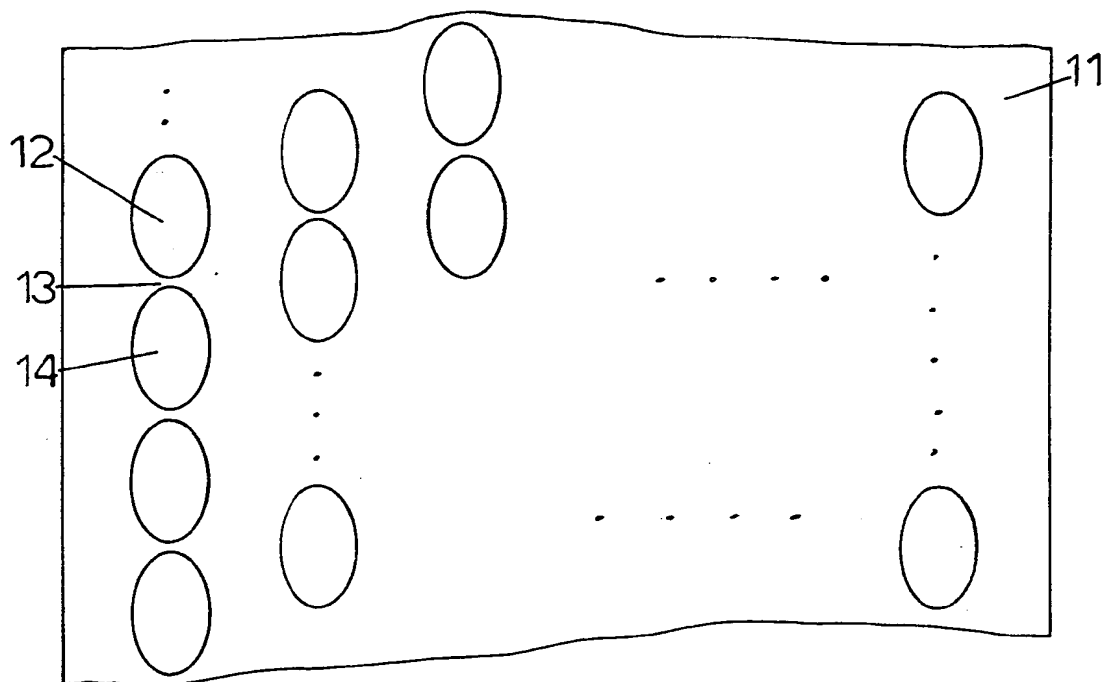


FIG 2



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EUROPEAN SEARCH REPORT

Application Number
EP 96 60 0007

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|--|---|---|--|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
| X | GB-A-1 184 635 (SHELL) 18 March 1970 * page 3, line 15 - line 42 * * page 3, line 113 - line 123; claims 1,4 * | 1-9 | B29D7/01 B29C55/04 B29D28/00 |
| A | GB-A-1 083 847 (SMITH & NEPHEW) 20 September 1967 * page 2, line 79 - line 100 * * page 3, line 20 - line 24; figures 3-8 * | 1-9 | |
| A | EP-A-0 484 554 (NIPPON PETROCHEMICALS CO LTD ;POLYMER PROCESSING RES INST (JP)) 13 May 1992 * figures 27,29 * | 1-9 | |
| | | | TECHNICAL FIELDS SEARCHED (Int.Cl.6) |
| | | | B29D B29C B65B B65D |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 2 December 1996 | Examiner Attalla, G |
| <p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p> | | | |

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